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ABSTRACT

Years of research have shown that student learning is based on cognitive development. This finding has implications for the teaching of vocational education, especially to marginal students who are potential dropouts. Research has shown that students who have an internal rather than an external locus of control and who are more field independent (analytical) than field dependent are more successful in learning. Vocational education teachers should, therefore, try various ways of presenting material so that students from any point on the continuum of field dependence-independence can learn. For example, it is helpful first to present new material as a completely independent unit, and then teach the material again and show how it relates to previous material and to the subject as a whole. This is more often effective with field-dependent students than starting out with integrated materials, although this approach will make more analytical students uneasy at first. Vocational teachers should also work on the students' locus of control, so that students understand that they have control over what happens to them and that success or failure is not just caused by luck. Finally, since students who are field dependent have often been unsuccessful in learning by traditional methods, they often have a poor self-concept. Efforts must be made to help these students see themselves as capable and to help them learn how to learn. Techniques such as small groups, individual instruction, and learning activities that require analytical skills may be used. Such an orientation is far more useful than simply teaching job skills; vocational programs that stress cognitive development will be more successful. (KC)

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COGNITIVE DEVELOPMENT AND TEACHING VOCATIONAL STUDENTS

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Vocational education is well known for providing alternative educational opportunities for students who are not college bound. Often times many of these students come to a vocational school because of a behavior and/or learning problems but are not classified as handicapped.

My concern is for these students who are in this gray area. They are not handicapped and they are not achievers. Often they come from low income homes where occupational training is a highly valued pursuit but a college education is not even considered.

When students in this gray area come to a vocational school, many people assume that the process of teaching a vocational skill will remediate behavior and/or learning problems. Sometimes this is true, but sometimes this is not true and the student drops out of school.

Why does the process of learning a skill work for some but not for others? Why do some children achieve and others do not? These have been my basic research questions for the past eight years, and I believe we are closing in on the problems of the non-achieving child.

RESEARCH STUDIES

Over the past five years my doctoral students and I have collected data from four sets of students. Basically we have looked at achievers, who were either ranked high in their class or above grade level, and non-achievers who were either two or more grade levels below their class or in the bottom ten percent of their class. We looked at students in junior high and in high school, in academic and vocational programs, living in a low socio-economic environment, and at their basic skills scores as well as vocational performances.

The variables used in these projects (see figure 1) have included locus of control, self concept, self esteem, motivation; self evaluation of instructional mastery, career maturity, occupational interests, and field dependence. My presentation today cannot cover all of the projects and findings but I will attempt to give you my perceptions that I have developed as a result of my involvement in this research.

LOCUS OF CONTROL

The reason a person gives for the success or failure that results from their action is a psychological construct called locus of control. If a person perceives

LOCUS OF CONTROL

SELF CONCEPT - Perceived and Referenced

SELF ESTEEM

MOTIVATION

INSTRUCTIONAL MASTERY

CAREER MATURITY

OCCUPATIONAL INTERESTS

FIELD DEPENDENCE

FIGURE 1. RESEARCH VARIABLES

a reward, or success, to be the result of his/her behavior or action, this person would be considered to have a more internal locus of control. People who are more internal believe they have greater control over their achievements than the forces outside of their control. On the other side of the continuum, those with a more external control perceive their success, and the corresponding reward, to be controlled by forces outside of their control (Rotter, 1954, 1966).

I feel that if people believe their success may or may not be a result of their action, such people would also perceive failure in the same way. In other words, if people do not believe they are able to influence their success because it is controlled by forces outside of their control, they would have to believe the same thing about their failures.

If children do not believe they can control their success or their failure, they develop what I call a negative cognitive attitude, meaning a learned attitude, about their ability to learn and evolve into dysfunctional learners. This cognitive attitude must be changed, I believe, before the child can demonstrate achievement.

In a taxonomy (see figure 2) proposed for achievement and based on our research findings (Garner & Cole, 1986 a), the first level of the taxonomy calls for a feeling of personal control over success and failure. After this level is achieved, then the child can develop a positive self concept which, in turn, will lead to motivation.

Beck (1974) points out that when people have established certain assumptions about themselves, they are not likely to articulate them. Thus, students with improper assumptions about their ability to learn are not aware of them and have to have help in modifying their improper cognitive assumptions.

I must also note that in one piece of this research, Perrino (1985) found that non-achieving students in vocational programs had very low scores on a test of career maturity. This would be logical because a student with an external locus would not be capable of making a realistic career choice. Thus, I also propose that the achievement taxonomy is a prerequisite to career maturity, which is critical for a student selecting an occupational field of study.

FIELD DEPENDENCE

The second variable, which demonstrated more significance in its' relation to achievement than any of the other variables we tested, was field dependence. Field dependence is a construct that is related to a person's cognitive mode of functioning through perceptual disembedding, or "the ability to break up an organized visual

1. CONTROL OVER SUCCESS/FAILURE

   A. Acceptance that results and corresponding success/failure of one's actions are self-generated.

   B. Conviction that success can only be achieved through personal effort.

   C. Willingness to make efforts to achieve.

2. POSITIVE SELF-CONCEPT

   A. Awareness that self-generated success and/or effort earns the respect of others.

   B. Realization that personal effort to achieve success is, in itself, a positive feeling.

3. MOTIVATION TO ACHIEVE

   A. Desire to earn recognition from others (extrinsic rewards).

   B. Desire to achieve for personal gratification (intrinsic rewards).

FIGURE 2. TAXONOMY FOR ACHIEVEMENT

field in order to keep a part of it separate from that field" (Witkin et al, 1971, p. 4).

Field dependence is not a measure of intelligence but is a continuum on which one side represents field independence and the other side denotes field dependence (see fig. 3). A field independent person has been found, among other things, to be more analytical, and a field dependent person is felt to be more sensitive to external cues and views information as a whole in order to apply it directly.

Analytical ability, which is one of the characteristics found to be related to field independence, refers to a person's competence in mentally breaking down concepts, events, geometric figures, etc. into part or elements in order to gain a greater understanding of the essential features of the whole concept, event, geometric figure, etc. In our research high achievers were found to be significantly more field independent than non-achievers (Garner & Cole, 1986 b), and I believe the reason behind this is the analytical powers of the field independent person.

I consider field dependence to be a measure of a person's cognitive processing style, however, and not just another measure of analytical ability. It has not been found to be related to social class or race. Ginsburg (1986) in a paper at the Eastern Educational Research Association's convention made a proposition from his research investigations that intellectual dependency is a cognitive style used when a student looks to a teacher for an answer and cannot learn independently. He also proposes that in some schools dependency is reinforced and may lead to higher grades.

I propose, however, that intellectual dependency is appropriate at the lower grades but that intellectual independence is more effective in the junior high and high school grades. I also propose that vocational education is typically more effective with students who are more intellectually independent than with those who are intellectually dependent.

COGNITIVE DEVELOPMENT AND TEACHING

As a result of my investigations and from other research, I have concluded that we must be more flexible in our instructional methodologies. The use of objectives in a cold, scientific manner can allow teachers to mass produce graduates in a vocational program with little personal involvement and personal risk, but I propose that in this application the risk to the potential drop out increases. Ginsburg (1986) points out in his paper that teachers cannot separate the intellectual development of the child from the child's personality, emotional, and motivational

FIELD INDEPENDENCE		FIELD INDEPENDENCE
	continuum	
1. Analytical		1. Sensitive to external cues
2. Breaks down concepts, figures, etc. into parts		2. Views information as a whole
3. High achievers in reading, math		3. Poor students in reading, math

FIGURE 3: FIELD DEPENDENCE CONTINUUM

development. He concluded that: 1) education is more than just learning in the cognitive sense of the word; 2) we need research in education that looks at the integration of cognitive and non-cognitive variables; and 3) we need research on the effectiveness of flexible teaching methodologies. He then suggested, and I concur, the consideration of a form of intellectual therapy whereby students are helped to overcome their resistances to learning.

In an extension of this line of thought, I believe we must concentrate on the cognitive development of the child in two areas at the same time, which I essentially have proposed in my recent publications based on our research. One area is cognitive attitude, which refers to the taxonomy for achievement shown in figure 2 (Garner and Cole, 1986 a), and the second area is with respect to cognitive ability, which concerns our being more proficient in teaching children at all points of the spectrum on the field dependence/field independence continuum shown in figure 3 (Garner and Cole, 1986 b).

More specifically, I suggest that we must determine where children stand with respect to their attitude about their ability to learn and the way they process information. When this has been accomplished, their teachers can use specific techniques to develop a student's attitude or to work with a child's cognitive ability.

Structuring Cognitive Attitudes

The structuring of a child's cognitive attitude cannot be brought about by pep talks or stern lectures. The non-achieving child has learned and is convinced that he or she cannot be successful in school. Therefore, the child must be convinced that he or she can learn. Often the joy of learning is not the learning, but in learning that one can learn.

To give an idea of how complicated the origination of the belief that one cannot learn can be, I have developed an example from a cognitive therapist's description of the ways distortions are developed (Freeman, 1983). The scenario is as follows: A capable young male child has learning experiences (such as eating, playing, etc.) whereby he does not perceive himself to be successful. This unsatisfactory feeling about his performance is reinforced day after day in a variety of ways and he eventually determines he is unable to learn. In time this becomes an extreme distortion of reality; particularly because young children tend to perceive things in absolute quantities (good vs bad, smart vs dumb); and he places the label dumb on himself.

Our young boy, who now believes he is not good at learning, extends his belief by generalizing that if one negative characteristic exists in one place, it exists everywhere. Therefore, he is convinced that other people also believe he is not a capable learner at anything. When something occurs contrary to this belief, the student disqualifies it because of luck, a mistake, or something of that order.

When a teacher tries to remediate this young boy, his overwhelming beliefs and train of thought will not be overcome by simply presenting subject material to him. Freeman (1983) suggests several cognitive strategies to cause people to test the reality of their beliefs. Two of these seem appropriate to the classroom situation (note: this is not to suggest that teachers should practice cognitive therapy, which is designed for people with disorders and takes at least two years of study to learn). First, the teacher must cause such children to question their evidence about their ability; and second, they must then reattribute their conclusions about success and failure to effort and not luck.

Particular techniques (see figure 4) to allow teachers to structure a child's cognitive attitude about his or her abilities may be: to individualize instruction (and attention) as much as possible with very clear directions; to be sure the teacher's and child's assessments of performance are NOT related to a lack of personal abilities; make assessments positive by concentrating on ways to improve and NOT on what was wrong; be sure learning tasks are incremental and able to be accomplished; use the mastery technique in which a child cannot progress to the next level until the present level is mastered; use formal recognition with verbal praise when a task is accomplished (college football coaches have found stars on helmets to be valued by players -- why not children); do not permit "put down" jokes, which are in vogue, directed toward the child's self or other children; keep anxiety down about failure; encourage expression about perceptions and ideas; and finally, do not allow your (the teacher) task orientation toward the need to cover the material on a lesson plan to compromise a compulsion about each child's success on each task.

Cognitive Ability

In relation to the cognitive processing abilities of students, I see a dual job for the teacher. At first glance they may seem to be in conflict but I do not view them as such. The first is for the teacher to be sensitive to the cognitive processing styles on the field dependence continuum, and the second is for the teacher to assist students in the development of their analytical ability, which does not mean to make them independent learners. A person who is field independent may be

1. Individualize Instruction
2. Clear Instructional Directions
3. Performance Assessments NOT Related to Lack of Ability
4. Make Assessments Positive on Ways to Improve
5. Incremental Learning Tasks
6. Use Mastery Learning Process
7. Formalize Recognition of Achievement
8. NO Put Down Jokes
9. Lower Anxiety about Failure
10. Encourage Creative Expression
11. BEWARE of Teacher Compulsiveness to Cover Lesson Plans

FIGURE 4: TECHNIQUES FOR THE DEVELOPMENT OF COGNITIVE ATTITUDES

more analytical but I believe a field dependent person can be helped in the development of their analytical skills.

In the first case, in which the teacher must work with the broad array of cognitive styles in a class, I propose two techniques at this time and note here that we need very badly to have more research conducted in this area. As shown in figure 5, the first suggestion is to be sure that students have an opportunity to receive instruction appropriate to their cognitive ability. This is critical for those who are intellectually dependent. Specific techniques could include personal instruction, small group instruction, and study groups for students who are more field dependent.

My last suggestion comes from my teaching experience in large accounting lecture classes. I have found that if I present a new concept in two ways, I can help students who are not more analytically inclined. The first is to present the concept without relating it to previously learned material. This tends to be uncomfortable for me because of my own teacher training and agitates some students who wish to relate the material to the big picture. For example, I teach depreciation as a unit without any reference about how it relates to the balance sheet or income statement. Upon completion of this presentation, I then immediately present the material as a unit applied in relation to previously learned material; at which time the anxiety of the more analytical students subsides. However, in using this method I typically do not lose those students who must relate to new material as a whole and then apply it directly, which is a description of a person more field dependent, and I do not lose those students who are more analytical. My experience has shown to me that by applying a new concept first and then teaching it can cause for some students a state of confusion that is not easily cleared up.

Because I have found in my research that field independent students score significantly higher in reading achievement, and I attribute this to their analytical ability, and because I believe analytical ability is critical in a society where technology effects most occupations; I believe teachers must help students develop analytical skills. In this area more research is also needed very badly. However, from my personal experience and my research I propose (see part II, figure 5) that teachers conduct in-depth analytical discussions with all students about several basic principles behind a concept or operation in order to arrive at a conclusion or understanding, promote creative activities whereby students must analyze a situation and propose solutions, have in-depth critiques related to sports events and

I. INSTRUCTION PER COGNITIVE ABILITY

- A. Personal Instruction
- B. Small Group Instruction
- C. Study Groups
- D. Two Way Presentations
  1. Unit as a Whole
  2. Unit as a Part of a Whole

II. DEVELOPMENT OF ANALYTICAL SKILLS

- A. Discussions on Principles Behind Concepts/Operations
- B. Creative Activities
- C. Critiques of Events/Activities
- D. Class Activities with Analysis of Project
- E. Guest Speakers who Promote Critical Thinking on Current Issues

FIGURE 5: WORKING WITH STUDENTS' COGNITIVE STYLES

activities, hold class activities in which students must establish the rules with an analysis of the activity throughout and at the end of the project, and invite guest speakers who will lead discussions that promote critical thinking on current issues. Obviously, a creative teacher can think of more ideas for their class than I can, but the point of this set of recommendations is to say to the teachers that they should focus on their students analytical development and not just their cognitive and vocational skill development.

CONCLUSION

From the research and recent scholarly positions taken on cognitive development, a considerable change in the teaching/learning practices and procedures seems imminent. The above, which will hopefully encourage change, offers some elementary ideas in comparison to the total realm of change that I believe will take place over the years ahead.

To take a futuristic stance for this conclusion allow me to give a few examples of the impact I expect from this new knowledge about cognitive development. First, the ideas of remediation will have to take on new objectives related to "learning to learn" rather than a subject orientation or job preparation. In addition, this will drive researchers and teacher educators into finding better ways to present material to the analytical and non-analytical based learners in order to lower the dropout rate, as well as to strengthen the cognitive attitudes of all children.

Because research has found that females are, on the average, less field independent (analytical) than males (Witkin, et al, 1971) and new teaching methodologies will assist the less analytical to be more proficient in math and science, the social expectations related to gender and careers will be able to be finally modified. At the same time, as youth have better analytical abilities upon college entrance, the adult returning to school will have to receive assistance in cognitive development, which will shift the basic teaching methodologies for adult educators.

Quality in the educational product is the new focus as the pressure of the baby boom and the practice of mass education fade in the 80's. As schools realize the potential effects that cognitive development can have in alleviating their remediation problem, as well as in raising the average performances of all students, the demand to modify the teaching/learning process will take place. Vocational schools that will (are) achieving reputations for offering quality programs will be

(are) those whose programs teach students the principles behind an occupational skill and the machinery used plus provide them with the analytical ability to relate to new skills and equipment; as compared to those schools who claim their responsibility is only to teach job skills.

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